

# Research, oil palm and sustainable development

Members of the general public in western countries (Europe, USA, Canada, etc.) are not very familiar with the oil palm commodity chain. Yet, palm oil is one of the emerging raw materials that have burst onto the world market over the last 30 years, and which are continuing to increase in importance for both producing countries and consumer countries. Over that period, palm oil and soybean oil evolved in a very similar way (table 1).

For what are now equivalent production levels, illustrating the exceptional vitality of the palm oil supply chain in relation to an otherwise all-conquering soybean oil supply chain, it can be seen that the areas being harvested are in a ratio of 1 to more than 7 (in 2004), with oil palm producing the highest yields per hectare of all oil crops (5 and up to as much as 7 tonnes of oil on estates exceeding several thousand hectares).

However, not all oil palm plantations are that efficient – some barely exceed 1 tonne of oil per hectare – either because the site is inappropriate and always will be (mediocre soil, insufficient rainfall, limiting minimum temperatures, poor drainage, steep slopes, etc.), or because management is inadequate (unselected planting material, competition from invading weeds, no fertilization, pest and disease damage, harvest losses, obsolete oil extraction methods with substantial oil losses, etc.). A degree of intensification will therefore only be possible in the second case. In recent decades, research has developed ways of making a strict choice of sites that are optimum for oil palm (soil classification, zoning, climate), the types of land developments required depending on the slope, rational fertilization, and IPM. But it is doubtless due to insufficient communication that all those involved in development have either poorly followed the recommendations, or not at all. Unless it was because of their sometimes dissuasive cost, in a context where there was no legal obligation to apply them: a soil survey is a laborious and lengthy operation. It is not just smallholders who have failed to follow through these preliminary precautions, through lack of means or through ignorance, but also large companies planting oil palm estates covering tens of thousands of hectares, with backing from funding agencies possessing limited experience in agricultural development. Hence estates that reach maturity and are unable to match the performance of older estates that were set up according to the rules of the art and which had served as references.

World palm oil requirements in the long term are very high (with parallel forecasts for soybean oil), and the annual rate of 200 to 300 000 ha of new plantings is set to continue, in order to meet food requirements. Most palm oil is consumed in highly populated emergent countries (China, India, Indonesia, Nigeria, etc.). This oil has therefore become inescapable as far as its outlets

Table 1.

	Areas cultivated <sup>a</sup> (millions of ha)		Oil production <sup>b</sup> (millions of Mt)	
	Soybean	Oil palm	Soybean	Palm
1964			3.7	1.3
1974	37.4	3.5	8.3	2.6
1984	53.0	4.7	13.3	6.4
1994	62.5	7.5	18.6	14.2
2004	91.7	12.0	30.6	30.5

<sup>a</sup> FAO source.

<sup>b</sup> OIL WORLD source.

are concerned. In the long term too, there is also a possibility for the oil palm to become a source of fuel to replace petroleum oil, which would further increase demand, as is the case today in Brazil, for example. It is a stroke of good fortune for this commodity chain, but such development will only be possible if it is brought about in a harmonious manner, limiting as far as possible any negative effects on physical or human environments.

Oil palm estates and oil mills, along with all the services associated with production, are contributing to the development of local economies, often in pioneer agriculture zones. On a world scale, almost 4 million people directly or indirectly earn a living from this activity. The process of plantation expansion creates durable employment as plantations and investments are established for a long period. In addition, long-term oil requirements guarantee the longevity and expansion of these local economies. However, it can be wondered whether the economic benefits derived from the commodity chain are shared out fairly within the societies involved. Oil palm growing has undergone very little mechanization, especially harvesting, and oil palm happens to be grown on a large scale in poor countries (Indonesia, sub-Saharan Africa) where the wages paid are among the lowest in the world. In emergent countries such as Malaysia, the inevitable and desirable growth in salaries may raise problems for the longevity of this agricultural activity in strictly economic terms. If the strong downward trend in world oil prices continues in the long term, we shall be heading more towards an impoverishment of the labour force working in these oil palm plantations, be they wage earners in agroindustries, or owners of small family farms. That is unless research is able to propose direct or indirect solutions for raising productivity and

reducing inputs, whilst improving working conditions.

But alongside economic and social aspects, environmental aspects must not be forgotten. The main criticisms made target the extension of oil palm plantations to the detriment of tropical rainforests, especially in Southeast Asia, where three quarters of the area planted to oil palm worldwide are concentrated in two countries, Malaysia and Indonesia. At the same time, these oil palm plantings are claimed to contribute towards the erosion of biological diversity and to carbon dioxide emissions, hence to the greenhouse effect, when planted after forests have been burned. Other aspects, notably pollution resulting from oil palm exploitation, are also incriminated.

It is therefore necessary to successfully reconcile, by all possible means, the indispensable extension of plantations to meet strong demand for palm oil, and tropical forest preservation. Stakeholders in the commodity chain are becoming increasingly aware of environmental issues, particularly in Asia and Latin America. This needs to be accompanied by integrating all the components of sustainable development and by providing answers on a commodity chain scale. In such a context, research has a paramount role to play.

One issue is that of extending oil palm plantations to the detriment of tropical rainforests. Worth noting is that in Indonesia, for example, none of the new oil palm plantations set up in the 1990s was planted on primary forest land. Large companies have succeeded in brilliantly recovering lalang grasslands (*Imperata cylindrica*) corresponding to the "Transmigration" of populations from Java to the sparsely populated zones of Sumatra and Kalimantan. The migrants were set up on 2 ha of cleared forest land per family and it was up to them to deve-

lop the plot of land with food crops (rice, maize, etc.) then tree crops. However, for various reasons, some of those programmes failed, the migrants returned home and Imperata established itself uniformly. Consequently, wherever possible, attempts must be made to find the best solutions for safeguarding forests as much as possible. Techniques for choosing sites (soil types, topography, drainage, etc.) facilitated by the modern technologies (satellite images, GIS) proposed by research should then make it possible to spare forests by using just a small part of them that offers the best agricultural potential and preserving the rest.

A second issue is biodiversity management. Alongside the reconversion of other crops (rubber, cocoa, coffee, annual crops) plantation extensions concern tropical rainforests, which are among the most biodiversity-rich environments on the planet, and whose biosphere regulating ecological functions are acknowledged. These forests are disappearing and being replaced by a new ecosystem – plantations – which consist of monocultures, with their associated range of plant and animal species, which together amount to relatively limited biological diversity. Destroying the habitat of pre-existing species locally leads to their disappearance, and includes some emblematic species such as the large mammals. This situation has drawn a strong reaction from nature protection organizations, and from the general public. Consequently, some distribution firms, such as Migros in Switzerland, no longer sell oil from plantations that do not respect certain specifications, notably requiring that the plantation be sited in an area where deforestation occurred prior to 1994, and insisting on a compulsory prior environmental impact assessment, and the introduction of a biodiversity conservation plan. This is also the case with certain

European banks, which rule out any funding to set up plantations in zones where recent forest clearance has been carried out.

In this field, everything, or almost everything remains to be done, which is why CIRAD, in partnership with an African development company, is examining the ways and means of making some headway, particularly on the most effective criteria and indicators. Reconciling production targets with the preservation of substantial biological diversity is no simple matter. Rational land development can play a role, by integrating the preservation of high conservation value zones (refuge zones for fauna and flora, including for the natural enemies of oil palm pests and diseases, fragile environments, buffer zones, corridors, etc.) and the existence of plantation zones proper. These are real issues for research to provide solutions to by studying real-life situations. As for forestry exploitation, there can be no doubt that it will become compulsory to draw up prior land development plans and set up impact monitoring systems. In some cases, agroforestry systems combining oil palm smallholdings and other crops, whilst respecting a large part of the ecological functionalities of the initial forest ecosystem, is one worthwhile alternative, but there is not yet enough research being conducted on this aspect.

A third issue is burning and management of the carbon cycle. During the ENSO (El Nino Southern Oscillation) dry spell, vast fires in 1997 and 1997 devastated some 10 million hectares in Indonesia. That ecological catastrophe led to atmospheric pollution that affected continental Asia. It would be completely exaggerated to place the entire blame on oil palm development in that country, even though it might have contributed in places. When there is an exceptional drought, the risk with fire is to destroy

not just the plot being cleared, but also the neighbouring forest stand, over distances that are impossible to predict. If policies to control climate change are stepped up, as can well be expected, it will become increasingly necessary to ban burning. This is already the direction being taken by policy in Malaysia and Indonesia, where zero burning is being introduced.

Setting up plantations does not merely lead to the emission of greenhouse gasses; fortunately, plantations contribute towards carbon sequestration through oil palm growth, which reduces the ultimate carbon balance. By extending the economic life span of plantations through planting material with slow vertical growth, and by gradually banning burning when replanting, it will already be possible to reduce greenhouse gas emissions. Of course, such a ban would be difficult to enforce among smallholders, for whom fire is the cheapest tool for land preparation. Nevertheless, research needs to continue intensively studying the comparative carbon sequestration results of balanced forests and plantations of various ages, taking the entire enterprise into account (including the oil mill), in order to produce practical and reliable results.

A fourth issue is environmental pollution. Excessive fertilizer applications can lead to excessive amounts of minerals in runoff water and water tables. In this area, research has gradually developed rational fertilization providing quantities of fertilizers that are limited to the strict minimum needed, based on a close analysis of requirements. A partial alternative to chemical fertilization is the composting of organic material from plantations (empty fruit bunches) and biological treatment of liquid effluents from oil mills, thereby making use of them whilst removing the risk of water pollution. Although pesticide use is limi-

ted in oil palm plantations when compared to other crops (banana, etc.), there is still a risk of pollution, though it is more easily controlled: research has made substantial progress in this area and integrated control – with pheromone traps for example – is efficient and helps to avoid pesticide use. Also worth mentioning is the use of cover crops when setting up replantings, to limit outbreaks of insect pests (*Oryctes*), whose larvae live off rotting oil palm stems. Such cover crops offer the dual advantage of fixing nitrogen from the air (nitrogen fertilizer savings without the associated risk of pollution) and reducing erosion in new plantings on slopes.

Although the development process remains highly dependent upon the international oils market alone, making it potentially vulnerable to price fluctuations, it is essential to provide a satisfactory level of social services for the populations (employees of large agroindustrial groups, and neighbouring smallholders), particularly in terms of healthcare and schooling, which is what most companies have been doing for a long time.

Sometimes, setting up plantations also runs into the problem of rights of access and use. Tropical forests are very rarely areas devoid of human societies. Hunter-gatherer societies, or farmers practising slash and burn agriculture are often the first occupants. Their historic rights are often flouted and contradicted by the State, which considers itself to be the sole owner. Environmental issues are thus combined with ethic and political problems concerning the first occupants. The only solution is to negotiate with those people and seek solutions through mediation, respecting their interests, and particularly guaranteeing them access to a means of existence from which they have always benefited. Such negotiation is not easy. For example, it first has to be determined who are the legitimate

claimants likely to take part in the process. Research in the social sciences may prove valuable in facilitating negotiations that need to reach long-lasting decisions that are not periodically questioned.

In terms of sustainable development, the incomes earned by populations from this activity need to be established more fairly, between smallholders and the oil mills purchasing their production, between plantation labourers and large companies, between producing companies, processing companies, and distributors in consumer countries. Only a well-structured negotiating system, and contractual relations between the different stakeholders in the productive sector, will lead to a sustainable balance on a sound footing.

Such mutual understanding will also provide a starting point for establishing quality improvement contracts; indeed, quality presupposes traceability and the constructive

pooling of efforts at each link in the commodity chain. Such is the case for the organic oil sector. Equity and a contract are increasingly becoming requirements, either imposed through consumer demands relayed via distributors and manufacturers, or the result of emerging standards being imposed by States, and of international agreements. For firms, this is also the basis of a rational policy in the search for quality and distinction on the markets.

To conclude, expanding the areas occupied by oil palm plantations and, more generally, the palm oil economy, calls for cooperation between all those involved. In this respect, the permanent Roundtable launched by the Sustainable Agriculture Initiative<sup>1</sup>, designed to establish a dialogue between stakeholders in the commodity chain, is an excellent initiative. Taking everybody's interests into

<sup>1</sup> Association of major agrifood companies.

account, respecting the rights of each party, drawing up and respecting environmental specifications, can only be achieved through consultation. Going one stage further, it can even be imagined that the establishment of plantations, their technical management, the respect of biodiversity, carbon management, pollution management and definition of the rights of local populations to access and use natural resources, will increasingly have to be covered by land development and management plans incorporating these different aspects, including international rules, resulting in frank and clear local consultations. ■

Bertrand TAILLIEZ<sup>1</sup>

Michel GRIFFON<sup>2</sup>

<sup>1</sup> Policy Coordinator, Oil Palm – Coconut, Cirad

<sup>2</sup> Policy Advisor, Sustainable development, Cirad